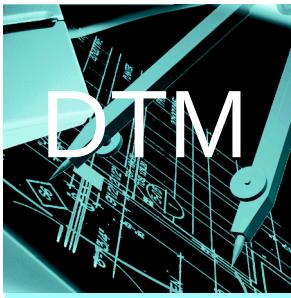
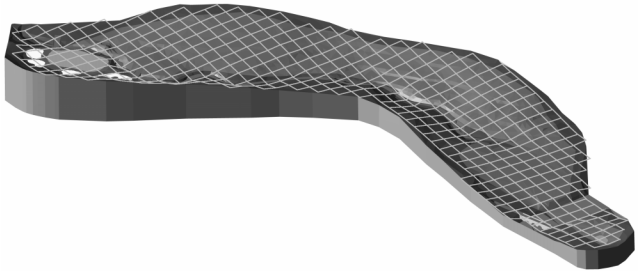
Digital Terrain Modeling



With VectorWorks, you can create 2D and 3D Digital Terrain Models (DTMs) from a wide range of information. In VectorWorks, a DTM is a mathematical model of 3D data that can generate a variety of 2D and 3D representations to aid in the visualization and analysis of the 3D data.



In addition to modeling a rolling landscape, you can create DTMs that show changes in other types of information such as hydrological measurements, temperatures, or financial data. VectorWorks lets you create these models from either point or line data, and display them using a variety of 2D and 3D objects—contour lines, triangles, and rectangular meshes, for example.

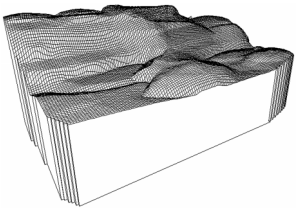
Because these models are depicted solely with standard VectorWorks objects, you can color, delete, and edit the results. For example, you could smooth 2D contour lines for a more natural look. You can even export your VectorWorks models as DXF/DWG files. Since the internal DTM settings, options, and mathematical model are saved with your drawing, you can use and alter the DTM.

In this Chapter

VectorWorks also has the ability to compare DTMs. If you create a model showing an existing terrain and another showing a proposed terrain, VectorWorks can calculate the cut and fill volumes needed to move from the existing to the proposed terrain. To do this, VectorWorks creates a third model (a cut & fill model) that displays the terrain differences.

At the same time, VectorWorks uses this information to create a graphical interpretation of the information—a collection of 2D and/or 3D objects. Do not confuse the DTM data with the collection of output objects which are in your drawing— VectorWorks views them as independent items. If you delete the output objects, you will not delete the DTM data or internal information and vice versa.

CREATING A DTM



Most DTMs are easy to create in VectorWorks. You can create a DTM from scratch or create a cut & fill DTM from two existing DTMs. All DTM commands are located in the DTM menu of the DTM workspace.

Create a New DTM

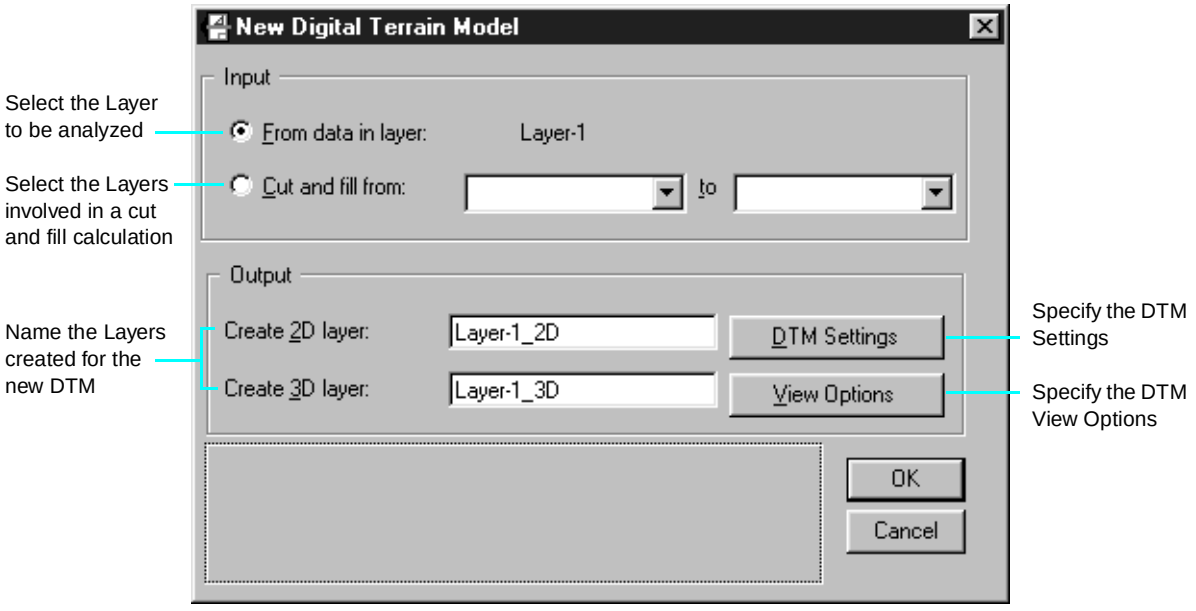
To create a new DTM

1. Import or create 3D data, or activate a layer that has 3D data.

   If you try to create the DTM from a layer containing fewer than three 3D data points, VectorWorks will give you an error message. A data point can be either a 3D locus or a vertex of a 3D polygon.

   To enter data points see “DTM Data” on page OL-DT-12.
2. From the DTM menu, select **New DTM**.

The New Digital Terrain Model dialog box appears.



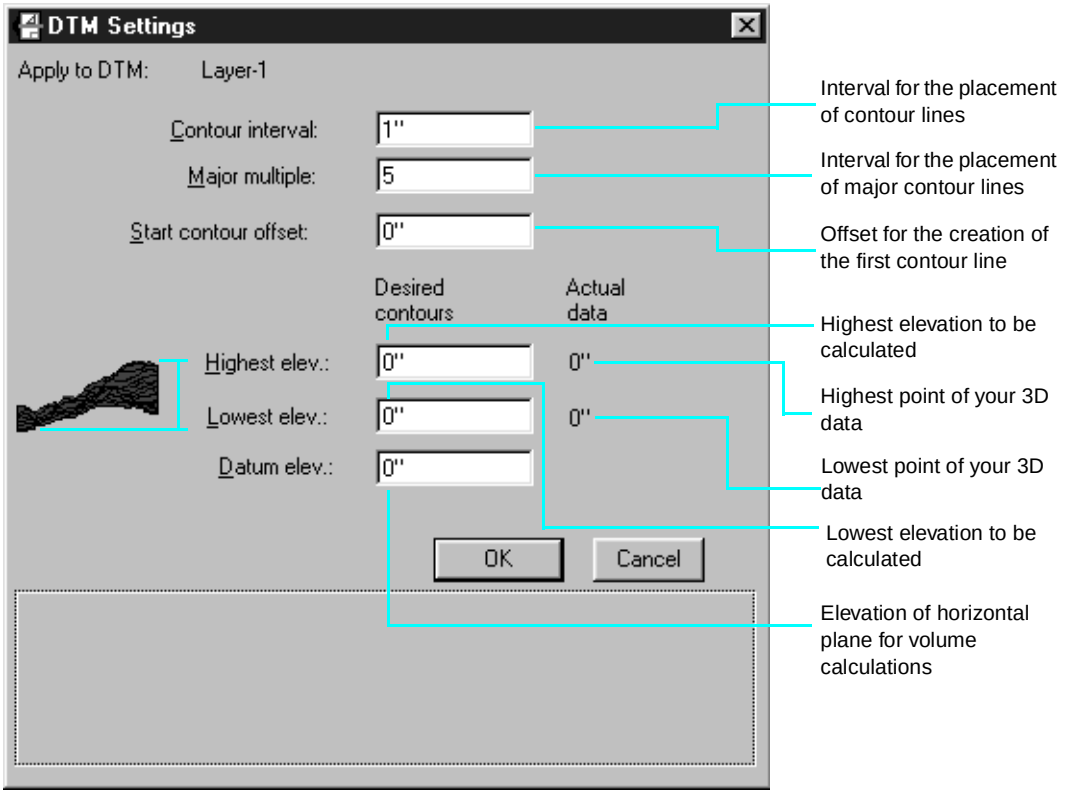
3. Check and/or specify the DTM input and output layer settings.

   Based on your drawing, VectorWorks will select an Input setting for your DTM. From data in layer will be selected in most cases. If you are currently in a layer which does not seem to contain sufficient data to create a DTM, and at least two DTMs exist in the drawing, then the second option (Cut and fill from) will be selected.

   VectorWorks also suggests names for the new layers that will be created with the DTM. If you wish, you may change these. Before doing so, review “Change a DTM’s Layer Names” on page OL-DT-22 to make sure that you don’t introduce any errors.

4. Click **DTM Settings**.

A dialog box appears.



5. Enter the desired criteria.

   Enter the elevation you want represented between standard contour lines in Contour Interval.

   Enter frequency of index (thicker) contour lines in Major Multiple.

   Enter the base elevation you want the contours to be measured from in Start Contour Offset. This will usually be zero.

   You can use the Start Contour Offset to cause contours to be created at odd elevations. For Instance, if you enter the value 1, you can have contours at 199, 201, 203, etc.

   In Highest elev., enter the elevation above which you would not want contours to be created. Likewise, in Lowest elev., enter the elevation below which you would not want contours to be created. If the value you enter for Highest elev. is less than the value for lowest, then no contours will be created.

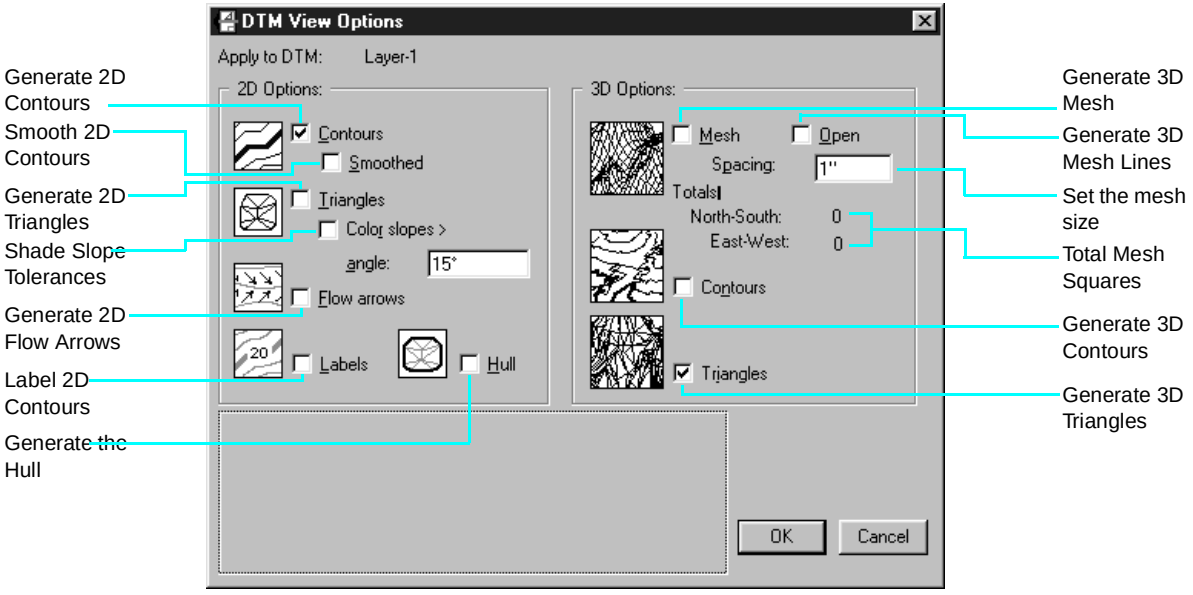
Note: The Datum elev. is used only for calculating cut and fill volumes for a DTM. For a normal DTM, VectorWorks calculates the cut and fill volumes needed to change the terrain to a horizontal plane at the elevation that you specify. For a cut & fill DTM these volumes represent the cut and fill necessary to get from DTM (e.g. existing terrain) to the 'To DTM' (e.g. proposed terrain) from the 'From DTM'.

6. Click **OK**.

   This will take you back to the New Digital Terrain Model dialog box.

7. Click **View Options**.

   A dialog box appears.



8. Enter any combination of 2D or 3D options.

   For the objects to be created in the 2D output layer of your DTM, choose from the following:

Option	Explanation
Contours	Contour lines will be drawn using 2D polygons.
Smoothed	Smooths contour lines using a method that decreases the likelihood of overlapping contours.

Option	Explanation
Triangles	The surface will be represented by triangles (closed 2D polygons). If you want to use these triangles for slope analysis, click the Color slopes checkbox and type the slope angle threshold you want in Angle.
Flow arrows	Arrows will be added to show the downward direction for drainage analysis. The frequency is determined by the 3D Mesh spacing value.
Labels	Elevations will be labeled on your 2D contour lines.
Hull	A closed 2D polygon will be drawn along the hull (outer edge) of the DTM.

Note: Each type of representation is placed in a class by VectorWorks so you can easily display combinations of objects by hiding and showing classes.

Note: Only open 2D polygons representing major (index) contour lines will be labeled with elevations; the labels appear along the hull, just outside of the DTM.

For objects to be created in the 3D output layer, choose from the following:

Option	Explanation
Mesh	DTM to be drawn using a regular grid of squares (closed 3D polygons). This will allow you to color, fill, and render (with shadows) this mesh.
Mesh and Open	DTM to be drawn using a regular grid of un-linked lines (open 3D polygons). You will be unable to render this mesh.
Contours	DTM to be drawn using 3D contours—these horizontal 3D polygons are stacked on top of each other.
Triangles	DTM to be drawn in its purest form, Triangulated Irregular Network (TIN). This method is the best one to use if you want to use advanced rendering programs/techniques.

Note: When you use Mesh and Open, this setting typically creates far fewer objects than when you select Mesh only.

Note: Triangles are the most mathematically precise and fastest way to draw 3D DTMs, but many people find the Mesh method easier to visualize.

Note: Enter a Spacing value which will give you a reasonable number of mesh lines or squares. The total number in each direction will be displayed after you change the Spacing value, though the actual number created might be different than the number displayed here.

9. Click **OK**.

   This will take you back to the New Digital Terrain Model dialog box.

10. Click **OK**.

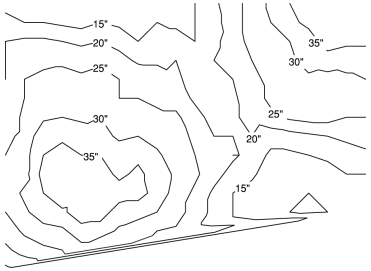
    VectorWorks will now create the DTM. VectorWorks will always take you to the Data View when it finishes an operation and will create a view in the View bar. To see objects in the 3D output layer, switch to that layer.

    The Data view of a particular DTM is a view in which the input layer is the active layer; the 2D output layer is visible in the background; and all other layers are hidden. Show Others is automatically selected in the Layer Options menu.

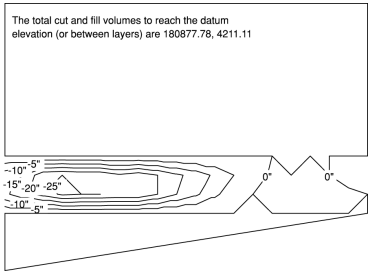
Creating a DTM that Shows Cut and Fill Volumes

To create a DTM that represents cut and fill volumes (a cut & fill DTM), you must first have two DTMs to compare—for example, a DTM that shows the existing terrain and one that shows the proposed terrain. In addition, one of the models must be totally enclosed by the other. It is okay if the two models have common boundaries; the boundary of the 'to model' must not extend outside of the 'from model'. VectorWorks calculates the cut and fill volumes going from the enclosing (larger) model to the enclosed (smaller) model. For this reason, you probably will want the DTM showing the existing terrain to be the enclosing model.

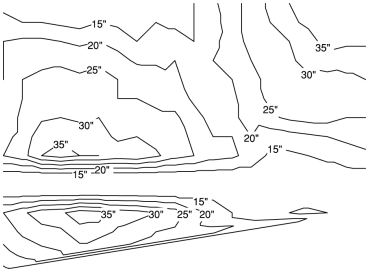
A cut and fill DTM appears and behaves like a normal DTM; however, it represents the difference between two other DTMs.



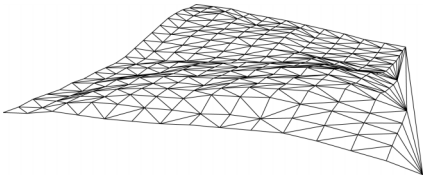
Original DTM 2D



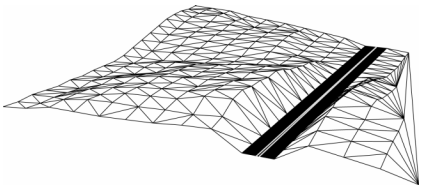
DTM Cut and Fill Diagram



Final DTM with Road Cut Out



Original DTM 3D



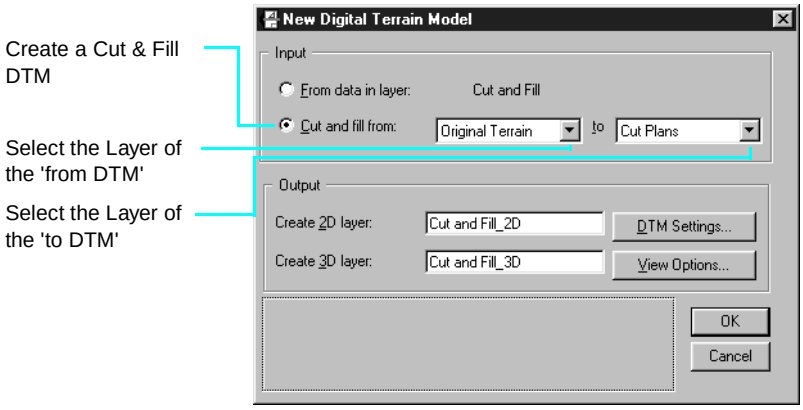
Final DTM with Road Cut Out

To create a cut & fill DTM

1. Go to a layer that is not associated with any DTM.

   If you need to, create a new layer. Remember, VectorWorks will automatically label your DTM using the name of the active layer. This layer does not need to contain any objects.
2. From the DTM menu, select **New DTM**.

The New Digital Terrain Model dialog box appears.

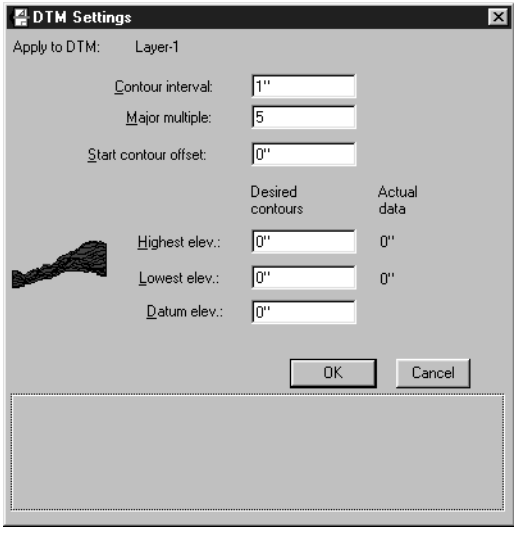


3. Check and/or specify the DTM input and output layer settings.

   Based on your drawing, VectorWorks will select an Input setting for your DTM. Cut and fill from should be selected if you are using existing DTMs to create a cut & fill DTM. In addition, VectorWorks will suggest the DTM you want to move from and the DTM you want to move to. If needed, you can change the order by selecting the layer names from the pulldown menus.

4. Click **DTM Settings**.

   A dialog box appears.



5. Enter the desired values.

   See “Enter the desired criteria.” on page OL-DT-4 for details. For contours enter values for Highest elev. and Lowest elev.. To the right of these textboxes, VectorWorks displays the highest and lowest possible differences in elevation between the two DTMs being compared.

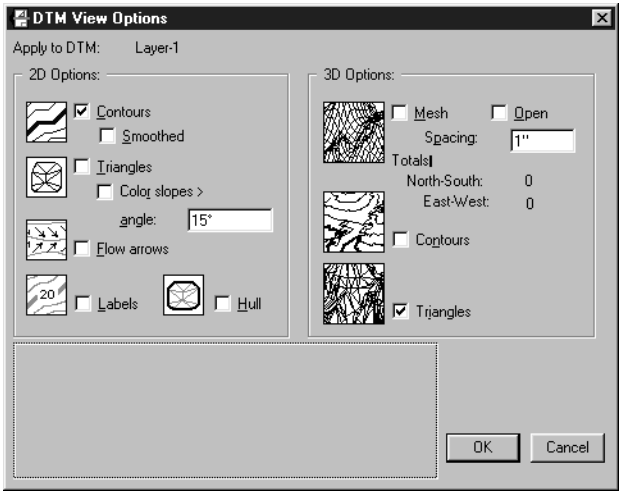
   Enter a Datum elev. value. For cut & fill DTMs this should normally be zero.

6. Click **OK**.

   This will take you back to the New Digital Terrain Model dialog box.

7. Click **View Options**.

   A dialog box appears.



8. Enter any combination of 2D or 3D options.

   See “Enter any combination of 2D or 3D options.” on page OL-DT-5 for details.

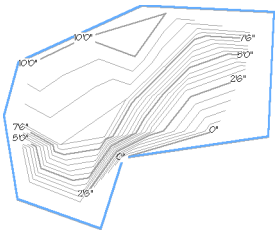
9. Click **OK**.

   This will take you back to the New Digital Terrain Model dialog box.

10. Click **OK**.

    VectorWorks will now create the DTM. The data generated represents a graphic report of cut and fill volumes, not the surface of the terrain as in regular DTM generation. VectorWorks will always take you to the Data View when it finishes an operation. VectorWorks creates a view in the View bar.

SETTING USER BOUNDARY

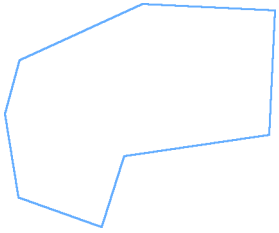


You can use any closed 2D polygon in the data layer as a user boundary. This user boundary serves two purposes: 1) To limit which data is used when creating a new DTM or recalculating an existing one; and 2) To restrict the DTM so that it does not extend outside of the user boundary.

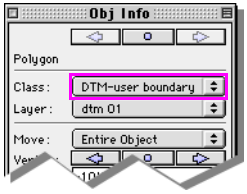
When a DTM is created or recalculated, only data which is on or inside of the user boundary is used. It does not matter whether the user boundary (or any other object) is selected when you choose this menu command. If a 3D polygon crosses the user boundary, then only that part of the 3D polygon which is inside of or along the user boundary will be used. If no user boundary is indicated (i.e. no closed 2D polygon in the data layer of a DTM has a class name of 'DTM-user boundary'), then all data in the data layer will be used when the DTM is first created or when it is recalculated.

To set a user boundary

1. Activate the layer containing the data.
2. Draw a 2D polygon which represents the area to which you want to confine the DTM.



3. Click the polygon.
4. From the DTM Menu, select **Set User Boundary**.



When you set the user boundary, VectorWorks assigns it a class name of 'DTM-user boundary'.

terrain. There are two ways to do this: use a scanner to create an electronic image to import into VectorWorks, and then use that to create your 3D data; or, manually calculate the 3D data, and then enter them into a grid in VectorWorks.

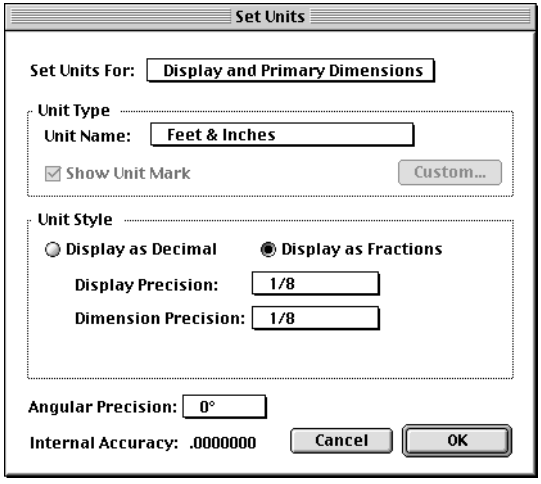
Steps for creating Data are located in the VectorWorks Toolkit>Specialties>DTM>Samples>Tutorial Examples.

IMPORTING FOR DTM

VectorWorks can import data from both DXF/DWG and delimited text files. Before you can import data from either type of file, though, you must first adjust the units and scale in VectorWorks. (VectorWorks' two-billion point data space is adjusted to represent larger or smaller areas using the combination of units and scale settings.)

To set units and scale for data point import

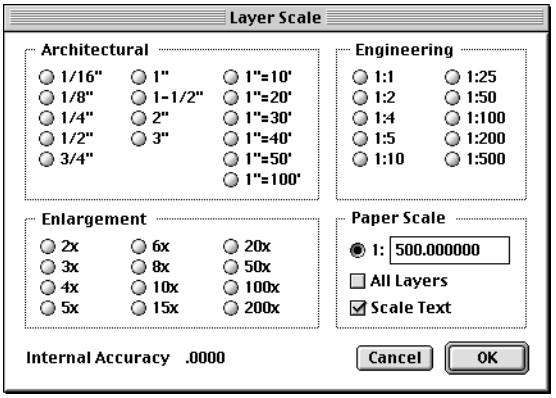
1. From the Page menu, select **Units**.



2. Select desired units and other options.

If needed, change the entry after Unit Name so that it matches the units in the file you are importing. If you are using measurements with decimals, select Display As Decimal, not Display as Fraction. If the data in the file you are importing is in feet, then you should select Feet, not Feet & Inches.

3. Click **OK**.
4. From the Page menu, select **Layer Scale**.



Pick a scale that will allow all of your data to fit into the drawing.

If you want the scale to apply to all layers, select the All Layers checkbox.

5. Click **OK**.

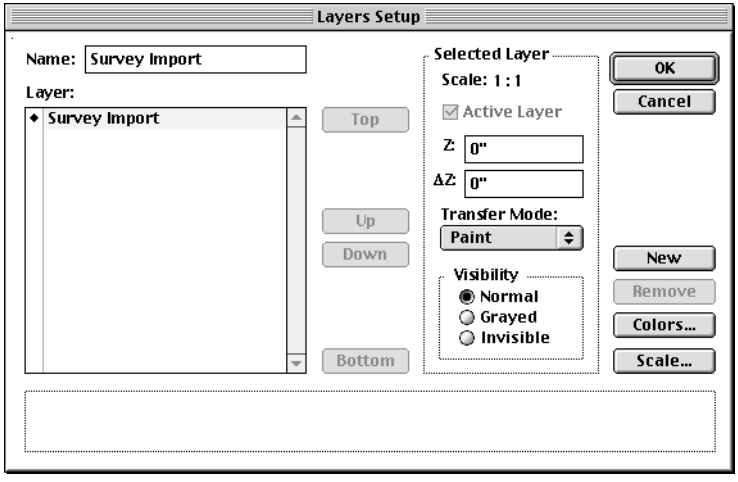
Importing DXF/DWG Files

VectorWorks makes importing DXF/DWG files easy because the program automatically converts AutoCAD's PLINES to polygons.

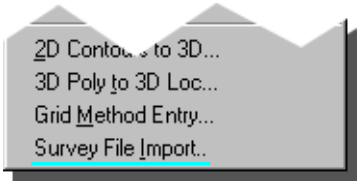
Note: If you have a DXF/DWG file that has 2D polygons, you will have to convert the 2D polygons into 3D polygons. VectorWorks can help make this conversion using the Convert 2D polys to 3D script.

To import DXF/DWG files for data points

1. Set the units and scale to match the source file's data.
2. From the File menu, select **Import** and then **Import DXF/DWG**.
3. Select the correct file name.
4. Click **Open**.


Layers Setup
Name:
Survey Import
Layer:
Survey Import
Top
Up
Down
Bottom
Selected Layer
Scale: 1 : 1
Active Layer
Z:
0"
ΔZ:
0"
Transfer Mode:
Paint
Visibility
Normal
Grayed
Invisible
OK
Cancel
New
Remove
Colors...
Scale...

5. From the DTM menu, select **Survey File Import**.



In the dialog box that appears, select the file you want to import, and then click Open.

The Survey File Import Setup dialog box appears.

6. Set your import options.

Specify the data order in the file you are importing—select either Easting, Northing, Elevation (X, Y, Z) or Northing, Easting, Elevation (Y, X, Z).

Select Tab Delimited if the data are separated by tabs. If the data are separated by some other character, click Other Character and type the character in the textbox.

If the data in your file includes Point Number and Description in addition to Pt.#, X, Y, Z, Description or Pt.#, Y, X, Z, Description—click the Data Contains Point # and Description checkbox.

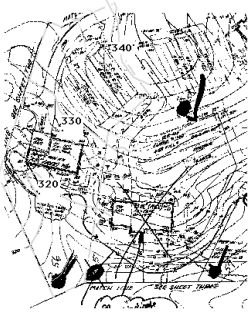
If you want to use a worksheet with the DTM, or if you want to retain a record of the original data, click the Attach Database Info to Loci checkbox.

If you want VectorWorks to report whether the DTM Data will fit in your drawing space, click the Verify Data at Origin checkbox. This will take more time.

Note: The survey import macro displays the first line of the file you are importing so you can have an example to help you determine the format.

7. Click **OK**.

A dialog box in the lower left corner will appear, showing you VectorWorks' progress.



Importing Scanned Contour Maps into VectorWorks

VectorWorks can import scanned contour maps as long as they are saved as one of the formats VectorWorks supports. After you've scanned and saved the map image, follow these steps in VectorWorks.

To import scanned contour maps

1. From the Organize menu, select **Layers**.

   The Layers Setup dialog box appears.
2. Click **New**.
3. Enter the Name and any other relevant details.
4. Click **OK**.
5. From the Page menu, select **Units**.

   If needed, change the Unit Name so that it matches the units in the contour map. (If you are using measurements with decimals, select Display as Decimal. If the data is in feet, you should select Feet, not Feet & Inches.)
6. Click **OK**.
7. From the Page menu, select **Scale**.
8. Set the scale to **1:1**.

   This will import the image into this layer in its actual size. Do not click the All Layers checkbox.
9. Click **OK**.
10. From the File menu, select **Import**.
11. Select the file type.
12. Select the correct file name.
13. Click **Open**.
14. Create a new layer in which to work, and set its scale so that it matches the scale of the image you have imported.

    Use the Scale button in the Layer Setup dialog with the new layer selected.
15. From the Organize menu, select **Layer Options** and then **Show Others**.

    This will let you see the scanned contour lines in the working scale you chose.
16. Use the 2D Polygon Tool to trace the contour lines in the scanned map image.

    Be sure to trace only those lines you want included in your DTM. (Many contour maps have two sets of lines—a dashed line representing the existing contours and a solid line that represents proposed contours.) Here are some other helpful hints before you start tracing.

17. Deselect everything in your working layer.
18. Set the fill pattern to **None**.

    This way the polygons you create will not overlap and hide the contour lines.
19. Set the pen color to a bright color that is distinct from the color of the imported layer.

    This will make it easier to see which lines you haven't yet traced.
20. Trace the lines.

Note: It is recommended to trace the contours in order from lowest to highest on the drawing for efficiency.

Be careful where you click. VectorWorks will use each vertex you draw to calculate the DTM. When you reach the end of a contour line—or a point where you want the line to stop—double-click to complete the polygon. Make sure that none of the polygons cross each other.

At any time if you want to see only the lines you've traced, go to the Organize menu, select Layer Options and then Active Only.

21. While you are in the layer with polygons, select **2D Contours to 3D** from the DTM menu.

    A dialog box appears. You can move the window to see the objects behind it.
22. Enter the Start Elevation and Interval between the contour lines.

    You can use the first elevation listed on the map or create your own and the Contour Interval, and select the method you want to use:

    Convert to 3D Loci is more flexible but less accurate. Use it if you think that later you will want to change points on lines rather than whole lines.

    Convert to 3D Polygons is more accurate but less flexible. Use it if you think that later you will want to change whole lines rather than points on lines. The 3D polygons give VectorWorks more complete information about the terrain than the 3D loci give.
23. Click **Enter**.

    VectorWorks automatically creates a new layer with the same properties and inserts the 3D loci or the 3D polygon into it. (If your active layer is named Traced, for example, VectorWorks will place the new objects in a layer called either Traced_Loci or Traced_Poly.)

    VectorWorks changed the color of the polygon you just converted. This will help you see which polygons you still need to convert.

increments horizontally across the top of the map, continuing until you have marked the entire terrain that you want to calculate—for example, if you're using a 1"=30' scale, mark 1" increments (representing 30' in your drawing) or 1/3" increments (representing 10'). Then, from the same origin point at the upper-left corner of the map, mark equal increments vertically down the side of the map, making sure that your horizontal and vertical marks are at right angles. Now, use the T-square to draw both horizontal and vertical lines through your marks, drawing a grid over the entire map.

2. From the Page menu, select **Units**.

   If needed, change the Unit Name so that it matches the units in the contour map. (If you are using measurements with decimals, select Display as Decimal. If the unit of measurement is feet, select Feet, not Feet & Inches.)

3. Click **OK**.
4. From the Page menu, select **Scale**.
5. Set the scale to 1:1.

   This will import the image into this layer in its actual size. Make sure All Layers checkbox is not checked.

6. Click **OK**.
7. Select **Grid Method Point Entry**.

   You will be asked to select a starting point.

8. Click somewhere in the upper-left corner of the page.

   A dialog box appears.

9. Enter the desired criteria.

   Enter the number of horizontal grid lines you drew on the contour map in Number Of Grid Rows.

   Enter the number of vertical grid lines you drew on the contour map in Number Of Grid Columns.

   Enter the real world distance between grid lines. For example, if each increment drawn on your map represents 10' in reality, enter 10' in Grid Spacing.

10. Click **OK**.

VectorWorks will automatically create a grid of 3D loci, which matches all the intersection points of the grid lines on your contour map. The loci will appear in red, and VectorWorks will automatically zoom in or out so that only these new loci appear on your screen.

If the grid dimensions can't be drawn into the VectorWorks drawing space using the currently selected units and scale, an error message will appear.

A dialog box appears.

11. Enter the elevation of the first locus (intersection point) on your grid—the one in the upper-left corner.

    To determine the elevation of a locus, look at the contour lines on your map. If the locus is directly on a contour line, enter the elevation that is listed for that contour line. If the locus is between two contour lines, enter an estimated elevation—one between the two elevations listed.

    After you enter a locus' elevation, VectorWorks will change its color to black. Continue with the remaining loci.

    If you want to temporarily stop entering elevation, click Done. To resume, select the locus you want to start with and select Grid Method Entry. VectorWorks will ask you if it should start accepting heights at the selected 3D Locus. Click Yes.

12. Click **Next**.

    If you hear a warning beep when you click Next, it means that the elevation you entered is out of range for the combination of scale and units you set.

13. Click **Done** to close the dialog box.

14. Adjust the scale and resume by selecting the Grid Method Entry script again.

    When you have entered elevations for all of the loci, VectorWorks will automatically close the dialog box.

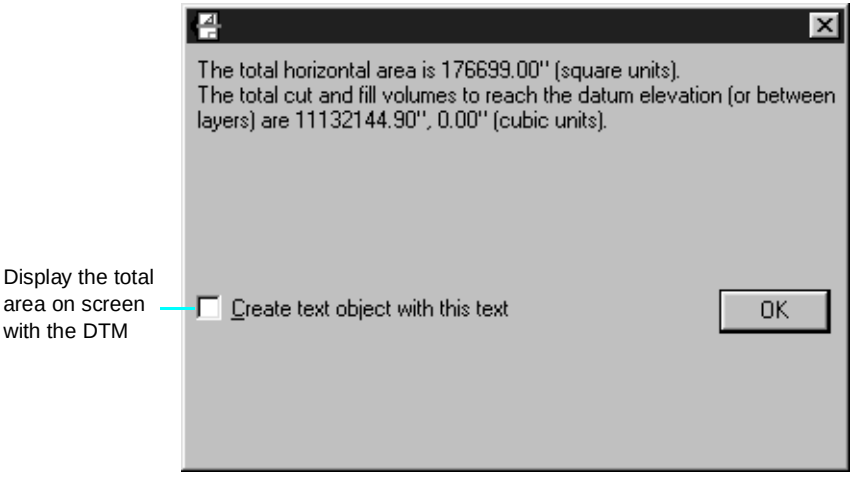
Calculating Area and Volumes

VectorWorks can automatically calculate the plan projection area of a DTM. It does this by projecting the model onto a horizontal plane. (The program does not have a command for calculating the areas of sloped surfaces.) It simultaneously calculates the cut and fill to get from the current surface to a horizontal plane at the datum elevation.

To calculate the area and volumes

1. Make sure that you are in the data layer or in a 2D or 3D layer associated with your DTM.
2. From the DTM menu, select **Display Area**, **Volumes**.

   VectorWorks will calculate the total horizontal area of your DTM—in the same units you used to create the model but squared—and display the result in a dialog box. The cut and fill volumes (to get from the current surface to a horizontal plane at the datum elevation) will also be displayed, in the same units as area, but cubed.



3. Decide if you want this information to become part of your drawing.

   If you do, click Create text object. VectorWorks will add this information to the 2D output layer of your DTM. If you want to, you can edit or move this text like any other text created in VectorWorks.

   If you don't, do not click Create text object.
4. Click **OK**.

CHANGE A DTM'S LAYER NAMES

You can enter data in any drawing layer. VectorWorks then automatically creates an output layer for 2D graphic objects and/or an output layer for 3D graphic objects, depending on your choices of view options. For example, if you enter the data for DTM in a layer named "Existing," VectorWorks stores: the original data in Existing; the 2D results in

Existing_2D; and, the 3D results in Existing_3D. If you want, you can name the layers yourself when you are creating a DTM. There are two important points to consider before changing layer names.

- VectorWorks' DTM function links layers with related names.

  If you change the names of the 2D and 3D output layers for a model called Existing to Anyname_2D and Anyname_3D, the program will no longer link these "new" layers to your model. If you later edit the data, VectorWorks will not update the output layers to reflect the changed coordinate.
- Other software programs have different naming restrictions.

  If you plan to export the layers of your DTM to a non-VectorWorks program, for example, we recommend that you do not use layer names that have special characters, spaces, or more than eight characters—the other program may not be able to read them.

Note: Make sure that the layer names are unique so your data is placed in the proper layers.

Note: If you must change the layer name for some reason, simply delete the DTM and recreate it using the new layer name in the New DTM Terrain Model dialog box.

MODIFYING A DTM

Once you've created a DTM, you can make three kinds of changes to it. You can change the DTM's data, settings, or view options. VectorWorks deletes objects in the output layers and recalculates, then redraws the new objects. For this reason, you may want to transfer a copy of objects that will change to a new blank layer for future reference.

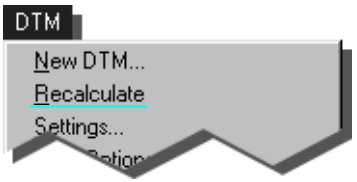
Changing Data

If you change the data in your model, you need to recalculate the model for your changes to appear on screen.

To change data

1. Edit data in a DTM data layer.

2. From the DTM menu, select **Recalculate**.



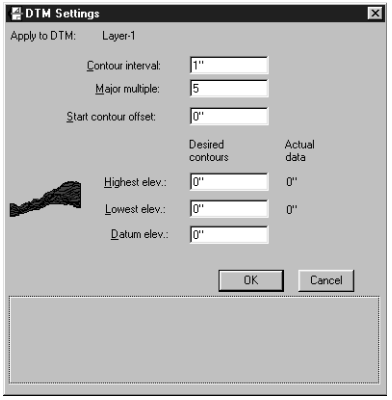
Changing Settings

At any time after creating your DTM, you can change the settings used to create it. For example, the contour interval or highest elevation can be changed.

To change settings

1. Make sure you are in the input layer or in the 2D or 3D output layer associated with your DTM.
2. From the DTM menu, select **DTM Settings**.

   The DTM Settings dialog box will appear.



3. Make any changes you want.
4. Click **OK**.

   VectorWorks will make the changes, taking you to the Data View when finished. An additional button (View Options) enables you to change your viewing options.

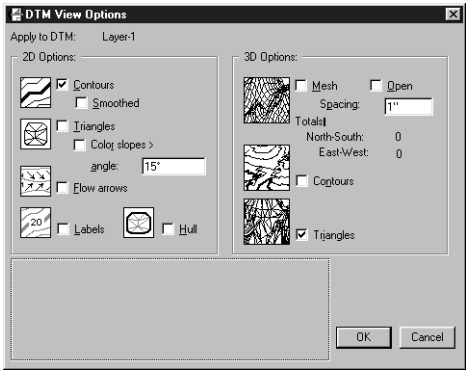
Changing View Options

At any time after creating your DTM, you can change its appearance—for example, changing 2D contour lines and displaying colored slope triangles instead.

To change view options

1. Make sure you are in a layer associated with your DTM.
2. From the DTM menu, select **View Options**.

   The DTM View Options dialog box will appear.



3. Make any changes you want.
4. Click **OK**.

   VectorWorks will make the changes, taking you to the Data View when finished.An additional button (View Options) enables you to change your viewing options.

Note: When changing the settings or view options of an existing DTM, VectorWorks will not recalculate the DTM; to incorporate changes to the data layer, you must use the Recalculate menu item.

SNAPPING TO THE SURFACE

Snap 3D Symbols and 3D Loci

Whenever you add a 3D symbol to your drawing, VectorWorks places it at the base elevation of the active layer. VectorWorks gives you an easy way

to automatically change the elevation of that symbol—and all other 3D symbols and 3D loci in that layer—so that the object is placed on the DTM's surface. The command adjusts all symbols and 3D locus points that lie within the hull, whether or not they are selected.

Note: When you have multiple DTM layers, make sure that you are in the correct layer before you begin placing objects. This can be a layer currently associated with an existing DTM, or you can place symbols in an independent layer and use layer links or a custom sheet to display your symbols with your DTM output layer.

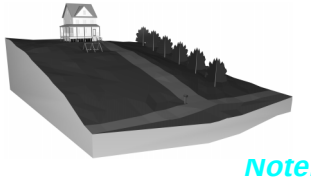
Note: If you are using floating 3D locus points, do not use the Data layer for this operation.

Note: All 3D locus points and 3D symbols in a DTM's 3D output layer are automatically adjusted each time you change the DTM's settings or view options or you recalculate the DTM.

To snap 3D symbols and 3D loci in the active layer

1. Make sure you are in the layer that contains the symbol(s) and 3D loci you want to adjust to the DTM's surface.
2. From the DTM menu, select **Float 3D Objects**.

CHANGING OBJECT ELEVATIONS



VectorWorks lets you change the elevation of selected 3D polygons and 3D loci, setting them all at the same level or raising or lowering all of them a specific distance.

Note: When you have multiple DTM layers, make sure that you are in the correct layer before you begin placing or moving objects. Do not use the Data layer unless you want to change the data.

To change the elevations of 3D polygons or 3D locus points

1. Make sure you are in the layer that contains the 3D polygon(s) or 3D locus point(s) you want to change.
2. From the DTM menu, select **Change Elevations**.

   A dialog box appears.
3. Specify the type of elevation change you want to make.

If you want all the vertices of all the 3D polygons and all of the 3D loci to be moved to the same elevation, select Set elevations to and then type the elevation in the textbox.

If you want to raise or lower all the vertices of all the 3D polygons and all of the 3D loci by a certain distance, select Increase elevations by and then type the change in the textbox.

4. Click **OK**.

Note: VectorWorks applies this command to all 3D polygons and all of the 3D loci in the active layer, not just the selected ones.

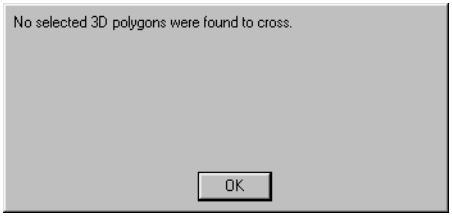
CHECKING 3D POLYGONS

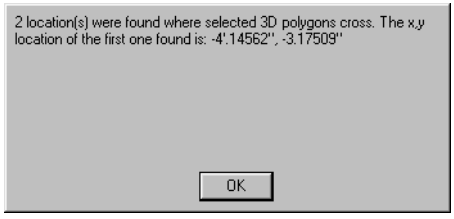
This method allows you to check all selected 3D polygons, to ensure that none of them cross each other. This is important, since a DTM usually will not be successful or correctly calculated if any of the 3D polygons used as input cross each other.

To check that 3D polygons do not cross

1. Select the 3D polygons you want to check
2. From the DTM menu select **Check 3D Polygons**.

   If one or more crossings were found, the number of crossings will be displayed in a dialog box. The coordinates of the first crossing will be displayed.





Note: The original 3D polygons are not changed.

Note: This command can be performed on any 3D polygons, whether or not they are associated with a DTM.

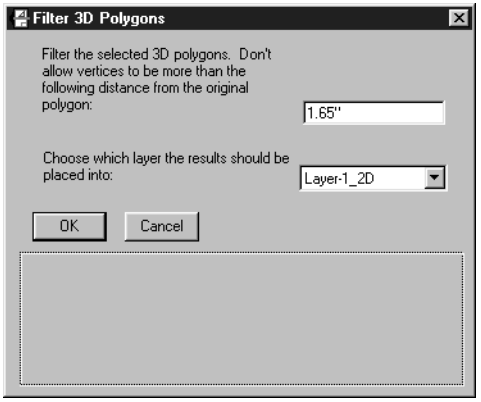
FILTERING 3D POLYGONS

This method can greatly reduce a DTM's complexity, and thereby reduce the time needed to calculate the DTM and the number of objects created to represent the DTM. It typically can reduce all this by about eighty percent, with very little effect on the appearance of the DTM.

To filter 3D polygons

1. Make sure you are in the layer containing the 3D polygons which you would like to filter.
2. Select those 3D polygons you wish to filter.
3. From the DTM menu, select **Filter 3D Polygons.**

   A dialog box appears.



4. Enter how far from the original polygon it can delete extra vertices by typing the distance in the textbox.
5. Specify the layer that you want the filtered polygon to be placed in by selecting the layer name from the pulldown menu.
6. Click **OK.**

Note: This command can be performed on any 3D polygons, whether or not they are associated with a DTM.

REMOVING A DTM

At any time, you can delete a DTM (mathematical model) that you have created without deleting the input data that was used to create it. When you do this, you can either keep or delete the graphic representation of the DTM in your drawing.

To remove a DTM

1. Make sure you are in a layer associated with your DTM.
2. From the Model menu, select **Delete**.

   A dialog box will appear, confirming that you do want to delete the mathematical model.
3. Click **Yes**.

   Another dialog box will appear, asking whether you want to delete the graphic representation in your drawing.

   If you want to also delete the graphic representation, click Yes.

   If you don't want to also delete the graphic representation, click No.

Note: The program uses the DTM class designations to determine which graphic objects to delete.

Note: If your file has been converted from a previous version of the program, the graphic objects will not be deleted, since the DTM class names that VectorWorks uses have changed.

REDUCING THE FILE SIZE

After you have created a DTM, VectorWorks gives you two ways to reduce the file space needed to store the DTM. In the process, though, you lose data and/or objects. For that reason, it is best to make sure you are truly finished with the DTM before changing the file size, or to save a backup copy of the original file that has all DTM information.

One way of changing the file size is to delete the DTM mathematical model and/or its graphic representation in your file as described in "Removing a DTM" on page OL-DT-29.

The other way to reduce file size is to filter 3D polygons as described in “Filtering 3D Polygons” on page OL-DT-28. If you then recalculate the DTM, the DTM will take up less space, and the number of graphic objects will be greatly reduced.